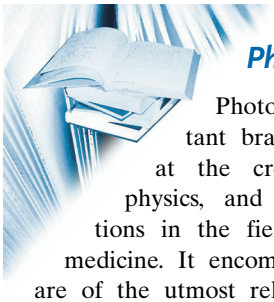


Supramolecular Photochemistry

Photochemistry is an important branch of modern science at the crossroads of chemistry, physics, and biology, with implications in the fields of engineering and medicine. It encompasses phenomena that are of the utmost relevance, both for living organisms and for technology. Research on biological systems in the past four decades has shown impressively that the value of the information or properties that can be obtained from the interaction between light and matter is very dependent on the degree of organization and complexity of the matter that has to receive and process the photons. In the same period, "the chemistry beyond the molecule"—i.e., supramolecular chemistry—took its first steps and rapidly established itself as one of the most flourishing areas of chemical sciences. The idea arose that molecules might be used as building blocks for the assembly of multicomponent materials and nanoscale devices exhibiting novel and valuable functionalities.

It is not surprising, therefore, that the marriage of photochemistry with supramolecular chemistry has been attracting the interest of many scientists, leading to outstanding research achievements that may provide innovative solutions for currently pressing problems related to energy, environment, sustainability, and health. Indeed, the ability to control the structure of matter at the molecular level—i.e., on the nanometer scale—can open up new and unconventional scenarios for the interaction between light and matter, a concept that is well summarized by the subtitle of the book that I have the pleasure to review.

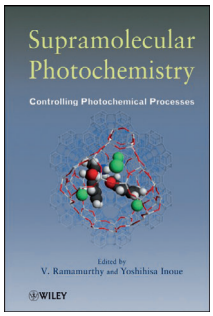
Supramolecular Photochemistry—Controlling Photochemical Processes aims to give the reader an overview of where supramolecular photochemistry is and where it is going. It comes some twenty years after the publication of two landmark monographs in the field, namely *Photochemistry in Organized and Constrained Media* by V. Ramamurthy (one of the editors of the present volume), and *Supramolecular Photochemistry* by V. Balzani and F. Scandola. As the topic has advanced exponentially since then, the release of a new book will be appreciated, even considering that over the years several excellent volumes have been published by CRC Press in the series "Molecular and Supramolecular Photochemistry". This volume provides a fresh and variegated picture of photochemistry applied to supramolecular systems, with contributions from renowned experts on several specific aspects of the field. The vast professional and editorial experience of V. Ramamurthy and Yoshihisa Inoue guarantees the overall quality of the book.

The volume consists of 14 self-contained chapters, some of which include a useful introductory section on the basic concepts that are relevant for the topics presented. The book starts with an elegant chapter describing the use of photochemical techniques to investigate the dynamics of supramolecular assemblies. Chapter 2 is a nice account of the templating strategies available to control various types of photochemical reactions in solution, while Chapter 3 describes the binding of fluorescent guests by macrocyclic hosts and the use of such systems for sensing applications. The fourth chapter illustrates the advances in the area of asymmetric photochemical synthesis in supramolecular environments.

Chapters 5–8 deal with photochemical studies in crystals, each one emphasizing different aspects of solid-state photochemistry. Chapter 5 describes how time-resolved crystallography can be used to gain insightful information about photoreactions in crystals. The state of the art on solid-phase photodimerization reactions and on host–guest photochemistry is described in Chapters 6 and 7 respectively. Chapter 8 deals with diarylethene crystals, one of the few photochromic systems with a potential commercial value. The following two chapters (9 and 10) discuss the photophysics and photochemistry of molecules entrapped within zeolites. Chapter 9 is a comprehensive account of photoinduced energy transfer processes between dye molecules hosted in the channels of zeolite L, and Chapter 10 describes how photoreactions can be controlled through non-covalent interactions inside zeolite nanocages.

Chapters 11 and 12 cover photochemistry and photophysics in polymeric matrices. Chapter 11 discusses the behavior of photoactive molecules included in polymers; it is not about the photochemistry of polymers but instead shows that polymeric materials can constitute useful substrates for photochemical reactions, with relevance for practical applications. Chapter 12 focuses on the use of ultrafast techniques to study photoinduced transport of energy and charge in organized assemblies based on biopolymers.

The last two chapters of the book both deal with *cis–trans* photoisomerization reactions. In Chapter 13 the authors focus on the mechanistic aspects of such processes, particularly when the active species are embedded in confined environments such as organic glasses, proteins, or crystals. The final chapter is a nice detailed presentation of current knowledge about the ultrafast light-triggered isomerization of retinal in the rhodopsin and bacteriorhodopsin photoreceptive systems. On reading this chapter at the end of the book, both professionals and newcomers to the field will be



Supramolecular Photochemistry
Controlling Photochemical Processes. Edited by V. Ramamurthy and Yoshihisa Inoue. John Wiley & Sons, Hoboken 2011. 640 pp., hardcover, € 129.00.—ISBN 978-0470230534

impressed by the remarkable fact that one of the most spectacular processes induced by light in a supramolecular context is that which occurs in our eyes!

The presentation is excellent for all chapters, which are also well provided with literature references. The volume has a satisfactory index and contains a large number of lovely illustrations; unfortunately they are in black and white in the print version, but some of them are available in color on the publisher's FTP site. My main criticism of this volume is that it has a marked bias towards solid-state photoreactivity: half of the chapters deal with photochemistry in crystals, nanostructured solids, or polymers. While it is certainly understandable, and in some respects desirable, that an edited book somehow reflects the tastes and interests of the editors, the consequence in the present case is that some relevant subjects are scarcely represented, or are not covered at all. Among these hot topics are, for example, assemblies based on photoactive nanoparticles, light-sensitive supramolecular devices and machines, multicomponent architectures for photochemical energy conversion, and self-assembled photoresponsive systems on surfaces.

In conclusion, *Supramolecular Photochemistry—Controlling Photochemical Processes* is a valuable reference book not only for experienced researchers but also for graduate students and postdoctoral fellows who are interested in exploring photochemistry at its frontiers with supramolecular chemistry, materials science, and biochemistry. It may also be a useful complement for students attending specialized courses, and serve to stimulate their curiosity about the application of photochemical methods to organized molecular assemblies. However, this is not an introductory text, and therefore it will be read much more profitably and enjoyably by those with some background in photophysics and photochemistry. Overall, the book is good value for money and is recommended to all researchers in the field.

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